REMARKS

This amendment is being filed in response to the Office Action dated July 17, 2002 for the above-referenced patent application. Claims 1-16 are pending in the application.

Claims 1-13 have been objected to because of informalities in the claims. The Examiner has stated that in Claim 1 "said Q-switch" should be replaced by "said semiconductor passive Q-switch." The Examiner has also stated that in Claims 2-13 "A semiconductor Q-switch" should be replaced by "A semiconductor passive Q-switch." Appropriate correction is submitted.

Claim 6 is rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention. The Examiner has stated that it is not explained why translation of the semiconductor passive Q-switch serves as a method of effecting the tuning of the output characteristics and that merely translating the Q-switch does not guarantee tuning.

However, contrary to the Examiner's statement, Applicants respectfully submit that translating the passive Q-switch in a direction transverse to the optical axis of the laser system will tune the output characteristics. Consequently, one skilled in the art would be enabled to tune the output characteristics as disclosed in Claim 6. Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claim 6 is respectfully requested.

Claims 1-2 and 14 have been rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent 6,215,805 (Sartorius et al.). The Examiner has stated that Sartorius et al. teach a semiconductor passive Q-switch providing variable outputs having defined output characteristics.

However, in Sartorius et al. the Q-switch provides variable outputs actively by pumping current which changes the index of refraction of the material. In contrast, the present invention discloses a semiconductor passive Q-switch that consists of a passive piece of semiconductor material where the variable transmittance is in the coating thickness deposited on the surface or change in the thickness of the semiconductor material itself. Furthermore, since Claim 1 is not anticipated by Sartorius et al, it is respectfully submitted that dependent Claims 2 and 14 are also not anticipated by Sartorius et al.

Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claims 1-2 and 14 as being anticipated by U.S. Patent 6,215,805 (Sartorius et al.) is respectfully requested.

Claims 1-4, 9 11 and 14-16 have been rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent 6,160,824 (Meissner et al.) further in view of U.S. Patent 5,832,008 (Birnbaum et al.). The Examiner has stated that Meissner et al. teach a semiconductor passive Q-switch providing variable outputs having defined output characteristics and that the replacement of the laserable gain medium in Meissner et al. by the gain medium in Birnbaum et al. would be obvious.

However, Birnbaum et al. teaches the use of a doped crystal as a passive Q-switch. The host material of Birnbaum et al. includes ZnSe, ZnO, chalcogenides, etc. but there is no semiconductor material. In contrast, the present invention uses an undoped semiconductor material such as GaAs. Therefore, the physical mechanisms are different in each invention. Furthermore, Birnbaum et al. does not teach or suggest variable outputs by translation of the Co:ZnSe or other doped crystal in a direction transverse to the laser axis.

Meissoner et al. teach a device structure used in constructing a waveguide laser and amplifier. However, variable outputs by translation of a passive Q-switch, with respect to the optical axis of the laser device as disclosed in the present invention, is not taught or contemplated by Meissner et al. Furthermore, traditional passive Q-switching devices operate by saturable absorption, which is obtainable by changing the thickness of the saturable absorber. In this case it would be the thickness of the semiconductor wafer. However, Applicants have established that the mechanism of saturable absorption in their invention is effected by the change in reflectivity of the coating, which results in Fabry-Perot effect in the wafer. Therefore, by having a coating of variable reflectivity coated on the semiconductor wafer, the present invention allows the coating to be used as a variable passive Q-switch. This further improvement is neither taught nor contemplated by any of the references cited by the Examiner. Consequently, Claim 1 is not obvious in view of Meissner et al. further in view of Birnbaum et al. Accordingly, it is respectfully submitted that dependent Claims 2-4, 9 11 and 14-16 are also not obvious in view of Meissner et al. further in view of Birnbaum et al.

Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claims 1-4, 9 11 and 14-16 as being obvious in view of U.S. Patent 6,160,824 (Meissner et al.) further in view of U.S. Patent 5,832,008 (Birnbaum et al.) is respectfully requested.

Claim 5 has been rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent 6,160,824 (Meissner et al.) or U.S. Patent 5,832,008 (Birnbaum et al.) further in view of U.S. Patent 5,015,353 (Hubler et al.).

For the above stated reasons independent Claim 1 is not obvious in view of Meissner et al. or Birnbaum et al. further in view of Hubler et al. Accordingly, it is respectfully

submitted that Claim 5, which is dependent on Claim 1 is also not obvious in view Meissner et al. or Birnbaum et al. further in view of Hubler et al. Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claim 5 as being obvious in view of U.S. Patent 6,160,824 (Meissner et al.) or U.S. Patent 5,832,008 (Birnbaum et al.) further in view of U.S. Patent 5,015,353 (Hubler et al.) is respectfully requested.

Claim 10 has been rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent 6,160,824 (Meissner et al.) or U.S. Patent 5,832,008 (Birnbaum et al.) further in view of Matt Young, Optics and Lasers Including Fibers and Optical Waveguides, ISBN 0-387-16127-9 (Young).

For the above stated reasons independent Claim 1 is not obvious in view of Meissner et al. or Birnbaum et al. further in view of Young. Accordingly, it is respectfully submitted that Claim 10, which is dependent on Claim 1 is also not obvious in view Meissner et al. or Birnbaum et al. further in view of Young. Therefore, in view of the foregoing, reconsideration and withdrawal of the rejection of Claim 10 as being obvious in view of U.S. Patent 6,160,824 (Meissner et al.) or U.S. Patent 5,832,008 (Birnbaum et al.) further in view Matt Young, Optics and Lasers Including Fibers and Optical Waveguides, ISBN 0-387-16127-9 (Young) is respectfully requested.

Claims 7, 8, and 12 have been objected to as being dependent upon a rejected base claim. For the above stated reasons the rejection of independent Claim 1 on which Claims 7, 8, and 12 depend is traversed. Therefore, in view of the foregoing, reconsideration and withdrawal of the objections to Claims 7, 8 and 12 is respectfully requested.

In view of the above remarks, reconsideration and allowance of all claims is respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

Respectfully submitted,

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Enclosures

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

The claims have been amended as follows:

1. (Amended) A semiconductor passive Q-switch providing variable outputs suitable for use in a laser system to produce laser pulses having defined output characteristics including a lasing wavelength, said semiconductor passive Q-switch including variable transmittance means at the lasing wavelength for tuning said output characteristics of said laser pulses.

2. (Amended) A semiconductor passive Q-switch according to claim 1 wherein said output characteristics include pulse duration, pulse repetition rate, peak power and averaged output power of said laser pulses.

3. (Amended) A semiconductor passive Q-switch according to claim 1 wherein said variable transmittance means includes a wafer having two surfaces that are optically polished, one or both surfaces being optically coated to form a gradient variation of transmission at a wavelength substantially in the IR region.

4 (Amended) A semiconductor passive Q-switch according to claim 3 wherein said surfaces are optically coated to form a gradient variation of transmission at a wavelength in the IR region.

5 (Amended) A semiconductor passive Q-switch according to claim 1 wherein said variable transmittance means includes a material having variable thickness, such as a wedge.

6 (Amended) A semiconductor passive Q-switch according to claim 1 wherein tuning of said output characteristics is effected by translating the Q-switch in a direction transverse to the optical axis of the laser system.

7 (Amended) A semiconductor passive Q-switch according to claim 1 wherein tuning of said output characteristics is effected by moving the Q-switch in a curvilinear path.

8 (Amended) A semiconductor passive Q-switch according to claim 7 wherein said curvilinear path included circular rotation.

9. (Amended) A semiconductor passive Q-switch according to claim 1 wherein said Q-switch functions simultaneously as an output coupler of said laser system.

10. (Amended) A semiconductor passive Q-switch according to claim 1 including undoped GaAs.

11. (Amended) A semiconductor passive Q-switch according to claim 1 including doped or undoped semiconductor material having properties of saturable absorption in the IR spectrum.

12. (Amended) A semiconductor passive Q-switch according to claim 11 wherein said semiconductor material includes AlGaAs or InP.

13. (Amended) A semiconductor passive Q-switch according to claim 1 having a multiple-quantum-well configuration.